

What is claimed is:

1. A device for preventing an air pump from sliding down the inside of a saddle post and/or the frame portion in which said saddle support post is mounted in, which comprises:

a spring, the diameter of said spring being less than the inner diameter of said frame portion and the length of said spring being less than the length of said frame portion, said spring being of the push type spring and having a spring constant  $k$  sufficient to push said air pump out of said frame portion, so that when said spring is inserted into said frame portion and an air pump is inserted into said frame portion on top of said spring, said spring pushes a portion of said air pump out of the top of said frame portion each time said saddle support post is removed from said frame portion.

2. A device as claimed in claim 1, wherein:

the combined length of said pump and said spring, when said spring is in the compressed state, is less than the length of said frame portion, so that said saddle can be lowered to its lowest position when a short person is riding the bicycle.

3. A bicycle air pump which comprises:

a conventional air pump; and

means for preventing said air pump from sliding down the inside of a saddle support post and/or the frame portion into which said saddle support post slides into, when said air pump is inserted inside said saddle support post and/or said frame portion.

4. An air pump for a bicycle as defined in claim 3, wherein said preventing means comprises:

a friction force generating means for preventing said air pump from sliding down said saddle support post and/or said frame portion.

5. A bicycle air pump as defined in claim 4, wherein said friction generating means

comprises:

a flexible ring portion integrally formed with a handle portion of said air pump, said flexible ring portion having an outer diameter which is greater than the inner diameter of said saddle support post and/or said frame portion, whereby, when said handle portion of said air pump is inserted into said saddle support post, said ring portion is pressed inwardly to fit inside said saddle support post, thereby generating a frictional force for preventing said air pump from sliding down said saddle support post.

6. An air pump for a bicycle as defined in claim 4, wherein said friction generating means comprises:

a flexible protrusion formed on the air pump, said protrusion having an outer periphery greater than the inner diameter of said saddle post, so that when said air pump is pushed into the inside of the saddle post, said protrusion deforms to fit therein, thereby generating a frictional force to prevent the air pump from sliding down the saddle post into the frame portion into which said saddle post slides into.

7. An air pump for a bicycle as defined in claim 3, wherein said preventing means comprises:

latch means for preventing said air pump from sliding down said saddle support post and/or said frame portion.

8. An air pump for a bicycle as defined in claim 3, wherein said air pump further comprises:

a nylon hose;

a male connector (7a) having a sleeve portion thereof (713) inserted into one end of said nylon hose, said sleeve portion having a tooth shaped protrusion formed on the outer surface thereof;

a female connector (7b) having a sleeve portion thereof (718) inserted into one end of said nylon hose, said sleeve portion having a tooth shaped protrusion

formed on the outer surface thereof;; and

a pair of pressure applying sleeves (7d) mounted on the respective extending ends of said nylon hose for preventing said sleeve portions from coming out of the ends of said nylon tube, and for preventing pressurized air from escaping therebetween, the inner diameter of said pressure applying sleeve being the same as the outer diameter of said nylon tube, so that said nylon tube can be easily inserted inside said pressure applying sleeve.

9. An air pump for a bicycle as defined in claim 3, wherein said air pump further comprises:

a nylon hose;

a male connector (7a) having a sleeve portion thereof (713) inserted into one end of said nylon hose, said sleeve portion having a tooth shaped protrusion formed on the outer surface thereof;

a female connector (7b) having a sleeve portion thereof (718) inserted into one end of said nylon hose, said sleeve portion having a tooth shaped protrusion formed on the outer surface thereof;; and

a pair of pressure applying springs (7e) mounted on the respective extending ends of said nylon hose for preventing said sleeve portions from coming out of the ends of said nylon tube, and for preventing pressurized air from escaping therebetween, the inner diameter of said pressure applying springs being the same as the outer diameter of said nylon tube, so that said nylon tube can be easily inserted inside said pressure applying springs.

10. A foot/hand air pump which comprises:

a round cylinder (70);

a hollow shaft (72), the outer diameter of said hollow shaft being less than the inner diameter of said cylinder;

a handle (71);

means for supporting said handle on one end of said hollow shaft, so that said handle can swivel around said shaft from a vertical position to a horizontal position;

a piston (76) mounted on the other end of said hollow shaft, said piston fitting inside said cylinder for pumping air therein in one direction thereof;

an end cap (74) mounted on the one end of said cylinder, said end cap having a hole formed through the center thereof for slidably receiving said shaft therein and for allowing air to pass therebetween;

an air outlet portion (75) mounted on the other end of said cylinder, said air outlet portion having a female connector (7c) mounted along a central portion thereof, said air outlet portion having a through hole formed therethrough, said through hole extending from a top surface of said air outlet portion to said female connector, said female connector facing in the radial direction of said cylinder,

said air outlet portion, said handle supporting means and said end cap having no portion thereof protruding beyond the circumference of said cylinder.

11. A foot/hand air pump as defined in claim 10, wherein said handle support means comprises:

a central shaft portion (73a) having a through hole (73h) formed in the axial direction thereof for frictionally receiving said one end of said shaft (72) therein;

a pair of handle support shafts (73s) integrally formed with said shaft portion along diagonally opposed outer sides thereof; and

a ring shaped portion (73r) formed along one end of said shaft portion (73a) for preventing said handle support from sliding down said shaft (72), the inner diameter of said ring portion being the same as the inner diameter of said shaft, one end of said shaft (72) being frictionally mounted inside said through hole in said shaft portion (73a).

12. A foot/hand air pump as defined in claim 10, wherein said handle comprises:

a semi-cylindrical body (71b) having a pair of through holes (71h) formed

along opposing sides thereof for receiving handle support shafts (73s) therein;

an inwardly facing tooth shaped ridge (71l) integrally formed with said semi-cylindrical body along an inner bottom circumferential edge of said semi-cylindrical body for latching said handle 71 to said end cap 74;

a wall (74w) integrally formed with said semi-cylindrical body along a top end thereof in the radial direction of said semi-cylindrical body, said wall having a through hole (71s) formed through the center thereof, for frictionally supporting a connector (7b) and the pipe (6) therein, and a V shaped slot (71v) extending from the periphery of the wall (71w) to said through hole (71s), the open section of the semi-cylindrical body (71b) and the periphery of the V shaped slot (71v) coinciding with each other, said slot (71v) allowing for easy guidance of said pipe (6) and said connector (7b) into said hole (71s) for frictionally being supported therein.

13. A foot/hand air pump as defined in claim 12, wherein said handle further comprises:

a plurality of semi-round protrusions 71p integrally formed along the outer surface of said semi-cylindrical body in the radial direction thereof, said protrusions further increasing the anti-slide frictional characteristics of said air pump 111 when said air pump is inserted inside a saddle support post of a bicycle.

14. A foot/hand air pump as defined in claim 10, wherein said end cap comprises:

a cylindrically shaped body (74s) having a through hole (74h) formed through the center thereof for receiving and slidingly supporting said shaft (72) therein and for allowing air to pass therebetween;

a thread portion (74t) formed at one end of the outer wall of said cylindrical body (74s);

a ridge (74r) formed on the outer wall of said cylindrical body along a central portion thereof; and

an outwardly facing tooth shaped ridge 74l formed on the outer wall of the

cylindrical body 74s at the other end thereof.

15. A foot/hand air pump as defined in claim 10, wherein said air outlet portion comprises:

a round shaft portion (75a), said round portion frictionally fitting inside said other end of said cylinder;

a round portion (75r) one end of which is integrally formed with said round shaft portion and the outer diameter of which is the same as the outer diameter of said cylinder;

a round main body section (75m) the diameter of which is smallest around the central part thereof and the bottom 75b of which is formed in a concave shape along one plane thereof, so that said concave shaped bottom surface can be utilized to prevent said main body section from sliding of a rim of a bicycle wheel during an air pumping operation;

a conventional female metal connector (7c) made of brass or aluminum embedded along a front side of said central part of said main body section, said air outlet portion having a through hole extending from the upper surface of said round shaft portion through said main body section to a central hole in said female connector for allowing compressed air inside said air pump to flow therethrough, the hole in said connector facing in the radial direction of said air outlet portion.

16. A foot/hand air pump as defined in claim 15, wherein said air outlet portion further comprises:

a tail portion (75t) integrally formed along the back and bottom surface of said main body portion, said tail portion being substantially rectangular in shape, said tail portion being flexible due to the material used in the manufacture thereof and due to the thinness thereof, so that said tail portions can be twisted around the bottom of said main body portion; and

a round portion (75e) integrally formed with the extending end of said tail

portion.

17. A foot/hand air pump as defined in claim 16, wherein:

said main body section has a second through hole (75h) and a slot (75s) formed along the front bottom section of the main body portion 75 in the axial direction thereof, said slot extending from the outside periphery of said main body portion to said second through hole, the width of said slot being less than the width of said tail portion and the diameter of said second through hole being equal to or greater than the width of said tail portion but less than the diameter of said round portion, so that said tail portion can be locked therein, said air outlet portion being made of plastic or nylon.

18. A foot/hand air pump as defined in claim 10, further comprising:

air pressure indicating means.

19. A foot/hand air pump as defined in claim 10, wherein said air pressure indicating means comprises:

a spring (900) mounted on a cylindrical portion (760c) of said piston, said cylindrical portion extending into the central hole in said shaft (72) and slidingly fitting therein, said spring having the same outer diameter as the outer diameter of said shaft;

a flexible strip (760l) one end of which is connected to the extending end of said cylindrical portion of said piston, said strip extending through said shaft, through the bottom side of said handle (710) and out of an opening (710h) formed in a wall (710w) formed at one end of said handle, the other end of said strip having a round portion (760e) integrally formed therewith, the diameter of said round portion being greater than the diameter of said opening formed in said end wall, so that said round portion locks said strip in said end wall of said handle, said handle further having a viewing hole (710v) formed along the top center portion thereof and said strip having a plurality of colors painted on one side thereof, so that when said air

pump is used to pump air, said spring compresses and the strip moves with respect to said viewing hole in said handle to visually display different colors representative of different air pressures via said viewing hole.

20. A foot/hand air pump as defined in claim 10, wherein said shaft comprises:

a flat sheet of metal (431) which has been rounded into a cylinder and said handle mounting means comprises a pair of diagonally opposed round protrusions (431p) pressed into said sheet metal at one end thereof.

21. A foot/hand air pump as defined in claim 10, wherein said handle comprises:

a flat sheet of metal having two holes punched out therethrough at opposite sides thereof, said sheet being rolled into a semi-cylindrical shape.

22. A foot/hand air pump as defined in claim 10, wherein said piston comprises:

a round shaft (84s) having a first, second and third radially extending rings (84a, 84b and 84c) integrally formed therewith along the outer surface thereof,  
a first O ring (841) mounted between said first ring and said second ring,  
a second O ring (842) mounted between said second ring and said third ring,  
said rings being spaced apart in the axial direction of said shaft by a distance which is greater than the thickness of said respectively mounted first and second O rings, said first and second rings each having a pair of diagonally opposed semi-round grooves (843, 844) formed on respective inner surfaces (f6, f8) thereof, each groove respectively extending in the radial direction of said rings from the outer surface of said shaft to the outer surface of said respective rings, said two pairs of grooves each only partially extending through said rings in the axial directions thereof.

23. A foot/hand air pump as defined in claim 22, wherein:

said shaft has a central hole (840r) formed in the axial direction thereof extending from a front end thereof to a central portion thereof for storing a lubricating material therein, and a pair of radial through holes (840l) extending in the



radial direction of said shaft from said central through hole to the outer surface of said third ring, whereby said lubricating material stored in the reservoir 840r is pushed through said radial holes 840l to lubricate said second O ring and the inner surface said cylinder of said air pump, thereby providing better air pumping characteristics.